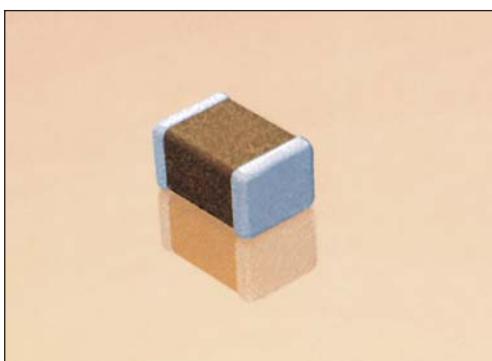


X5R Dielectric

General Specifications



GENERAL DESCRIPTION

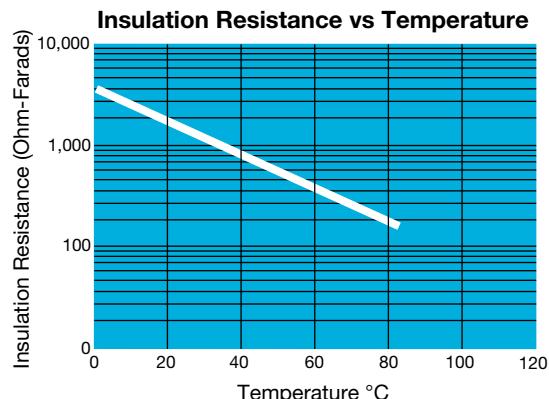
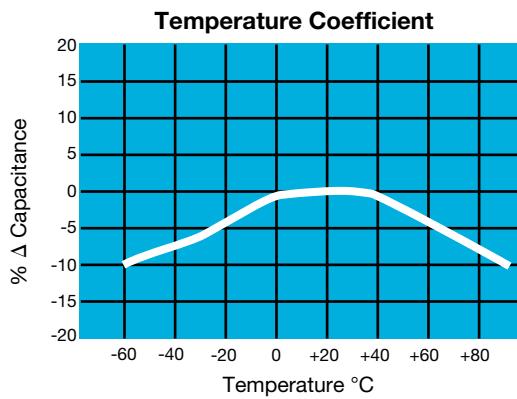
- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within $\pm 15\%$ from -55°C to $+85^{\circ}\text{C}$
- Well suited for decoupling and filtering applications
- Available in High Capacitance values (up to $100\mu\text{F}$)

PART NUMBER (see page 2 for complete part number explanation)

1210	4	D	107	M	A	T	2	A
Size (L" x W")	Voltage 4 = 4V 6 = 6.3V Z = 10V Y = 16V 3 = 25V D = 35V 5 = 50V	Dielectric D = X5R	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance K = $\pm 10\%$ M = $\pm 20\%$	Failure Rate A = N/A	Terminations T = Plated Ni and Sn	Packaging 2 = 7" Reel 4 = 13" Reel 7 = Bulk Cass. 9 = Bulk	Special Code A = Std.

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.

TYPICAL ELECTRICAL CHARACTERISTICS



X5R Dielectric



Specifications and Test Methods

Parameter/Test	X5R Specification Limits		Measuring Conditions
Operating Temperature Range	-55°C to +85°C		Temperature Cycle Chamber
Capacitance	Within specified tolerance		
Dissipation Factor	$\leq 2.5\%$ for $\geq 50V$ DC rating $\leq 3.0\%$ for $25V$ DC rating $\leq 12.5\%$ Max. for $16V$ DC rating and lower Contact Factory for DF by PN		Freq.: $1.0 \text{ kHz} \pm 10\%$ Voltage: $1.0 \text{ Vrms} \pm .2\text{V}$ For Cap $> 10 \mu\text{F}$, $0.5 \text{ Vrms} @ 120\text{Hz}$
Insulation Resistance	$100,000\text{M}\Omega$ or $500\text{M}\Omega - \mu\text{F}$, whichever is less		Charge device with rated voltage for 120 ± 5 secs @ room temp/humidity
Dielectric Strength	No breakdown or visual defects		Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)
Resistance to Flexure Stresses	Appearance	No defects	Deflection: 2mm Test Time: 30 seconds 1mm/sec 90 mm
	Capacitance Variation	$\leq \pm 12\%$	
	Dissipation Factor	Meets Initial Values (As Above)	
	Insulation Resistance	\geq Initial Value $\times 0.3$	
Solderability	$\geq 95\%$ of each terminal should be covered with fresh solder		Dip device in eutectic solder at $230 \pm 5^\circ\text{C}$ for 5.0 ± 0.5 seconds
Resistance to Solder Heat	Appearance	No defects, <25% leaching of either end terminal	Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 ± 2 hours before measuring electrical properties.
	Capacitance Variation	$\leq \pm 7.5\%$	
	Dissipation Factor	Meets Initial Values (As Above)	
	Insulation Resistance	Meets Initial Values (As Above)	
	Dielectric Strength	Meets Initial Values (As Above)	
Thermal Shock	Appearance	No visual defects	Step 1: $-55^\circ\text{C} \pm 2^\circ$ 30 ± 3 minutes
	Capacitance Variation	$\leq \pm 7.5\%$	Step 2: Room Temp ≤ 3 minutes
	Dissipation Factor	Meets Initial Values (As Above)	Step 3: $+85^\circ\text{C} \pm 2^\circ$ 30 ± 3 minutes
	Insulation Resistance	Meets Initial Values (As Above)	Step 4: Room Temp ≤ 3 minutes
	Dielectric Strength	Meets Initial Values (As Above)	Repeat for 5 cycles and measure after 24 ± 2 hours at room temperature
Load Life	Appearance	No visual defects	Charge device with $1.5X$ rated voltage in test chamber set at $85^\circ\text{C} \pm 2^\circ\text{C}$ for 1000 hours (+48, -0). Note: Contact factory for *optional specification part numbers that are tested at < $1.5X$ rated voltage. Remove from test chamber and stabilize at room temperature for 24 ± 2 hours before measuring.
	Capacitance Variation	$\leq \pm 12.5\%$	
	Dissipation Factor	\leq Initial Value $\times 2.0$ (See Above)	
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)	
	Dielectric Strength	Meets Initial Values (As Above)	
Load Humidity	Appearance	No visual defects	Store in a test chamber set at $85^\circ\text{C} \pm 2^\circ\text{C}/85\% \pm 5\%$ relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 ± 2 hours before measuring.
	Capacitance Variation	$\leq \pm 12.5\%$	
	Dissipation Factor	\leq Initial Value $\times 2.0$ (See Above)	
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)	
	Dielectric Strength	Meets Initial Values (As Above)	

X5R Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE	0201	0402	0603	0805	1206	1210	1812
Soldering	Reflow Only	Reflow Only	Reflow Only	Reflow/Wave	Reflow/Wave	Reflow/Wave	Reflow Only
Packaging	All Paper	All Paper	All Paper	Paper/Embossed	Paper/Embossed	Paper/Embossed	All Embossed
(L) Length	MM (0.024 ± 0.001)	MM (0.040 ± 0.004)	MM (0.063 ± 0.006)	MM (0.079 ± 0.008)	MM (0.126 ± 0.008)	MM (0.126 ± 0.008)	MM (0.177 ± 0.012)
(W) Width	MM (0.011 ± 0.001)	MM (0.020 ± 0.004)	MM (0.032 ± 0.006)	MM (0.049 ± 0.008)	MM (0.063 ± 0.008)	MM (0.098 ± 0.008)	MM (0.126 ± 0.008)
(t) Terminal	MM (0.006 ± 0.002)	MM (0.010 ± 0.006)	MM (0.014 ± 0.006)	MM (0.020 ± 0.010)	MM (0.020 ± 0.010)	MM (0.020 ± 0.010)	MM (0.024 ± 0.014)
WVDC	4 6.3 10 16 25	4 6.3 10 16 25 50	4 6.3 10 16 25 35 50	6.3 10 16 25 35 50	6.3 10 16 25 35 50	4 6.3 10 16 25 35 50	6.3 10 16 25 50
Cap (pF)	100 150 220		A A A				
				C C C			
330 470 680		A A A					
1000 1500 2200		A A A		C C C			
3300 4700 6800		A A A		C G G			
Cap (μF)	0.010 0.015 0.022	A		G G G G	N		
	0.033 0.047 0.068		C C C	G G G G	N N N		
0.10 0.15 0.22	A	C C		G G G	N N N	Q	
0.33 0.47 0.68		C C		G G	N N N	Q Q	X
1.0 1.5 2.2		C C C		G G G J	N N P*	Q Q	X X X
3.3 4.7 10		C		G G J J	N N N	Q Q	Z X
22 47 100			J J K		N N N N N	Q Q Q Q Q	X Z Z Z
					N N N N N	Q Q Q Q Q	Z
WVDC	4 6.3 10 16 25	4 6.3 10 16 25 50	4 6.3 10 16 25 35 50	6.3 10 16 25 35 50	6.3 10 16 25 35 50	4 6.3 10 16 25 35 50	6.3 10 16 25 50
SIZE	0201	0402	0603	0805	1206	1210	1812

Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	0.56 (0.022)	0.71 (0.028)	0.90 (0.035)	0.94 (0.037)	1.02 (0.040)	1.27 (0.050)	1.40 (0.055)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
PAPER												EMBOSSED	

= Under Development

*Optional Specifications – Contact factory

NOTE: Contact factory for non-specified capacitance values

